

**OPTICAL DEVICES AND METHODS EMPLOYING NANOPARTICLES, MICROCAVITIES, AND  
SEMICONTINUOUS METAL FILMS**

**ABSTRACT OF THE DISCLOSURE**

5           An optical sensing enhancing material (and corresponding method of making) comprising: a  
medium, the medium comprising a plurality of aggregated nanoparticles comprising fractals; and a  
microcavity, wherein the medium is located in a vicinity of the microcavity. Also an optical sensor  
and sensing method comprising: providing a doped medium, the medium comprising a plurality of  
aggregated nanoparticles comprising fractals, with the material; locating the doped medium in the  
10 vicinity of a microcavity; exciting the doped medium with a light source; and detecting light reflected  
from the doped medium. Also an optical sensing enhancing material comprising a medium, the  
medium comprising a semicontinuous metal film of randomly distributed metal particles and their  
clusters at approximately their percolation threshold. The medium preferably additionally comprises  
a microcavity / microresonator. Also devices and methods employing such material.

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